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IT'S A RELATIVE WORLD TO ME
by US

(Full intro)

In science history

There was a world of mystery

But one man helped ~~us~~ ^{most} to see

It's a relative world to me

(intro)

Oh Isaac Newton's notion

Brought forth the laws of motion

Which said that where we live

Every movement is relative

My motion has no identity

(If I) don't have something next to me

(That) shows me I'm moving with velocity

While it remains at rest on the earth

That's with respect to me

Nothing has an independent motion

Absoluteness is a silly notion

Newton started off a great explosion

And flew into historical fame

~~But~~

It was with certainty

Maxwell studied electricity

And found that current goes

At a rate that every physicist knows

The speed of light which equals "C"

Is the same for electricity

(So light moves electromagnetically)

And travels like electrical charge

With great velocity

And light travels through a chemical potion

It's called the ether, it's got absolute motion

If absoluteness is a silly notion

Someone tell me what's going on

So everyone tried to figure it out

And some theories of light started floating about

But finally they found without a doubt

That ether wasn't actually there.

Just hangin' everywhere.

*(Stop-look listen feel)

And ether doesn't slow down light's motion

The speed of C is a permanent notion

And I'm feelin a confused emotion

Someone tell me what's going on

(Full intro)

Now Albert Einstein

He really used his mind

And then he made us see

It's a relative world to me

(He said): the speed of light will equal "C"

To anyone in constant velocity

And physical laws will always be

The same for anyone moving that way

With uniformity

Absoluteness is imagination

And relativity's the explanation

We're gonna give some more information

But I think you'd better sit down

(intro)

With relativity

Things're different, you'll always see

All time to you and me

Isn't part of reality

(If two clocks) are at rest everything is fine

But if one of them moves you cross the line

'Cause motion effects the rate of time

Cause time is just a function of light.

Which travels constantly

Motion slows time's forward action

It's responsible for time's contraction

You're giving me a strange reaction

But I've gotta tell you much more

(SPOKEN:)

Relativistic Time Dilation, or the exact amount time shrinks

when a clock or anything moves is equal to the time

measured by a non-moving clock multiplied by the square

root of one minus the proportion of v^2 divided by c^2 ,

where v is equal to the speed of light and c is the speed of

^{some fraction of}

②

light. Time Dilation can really only be noticed at very,
very fast speeds--although its always happening.
Scientists have also found that lengths contract in the
same way getting smaller and smaller and finally
shrinking to nothing when you reach the speed of light.

(Full intro)

In a different reference frame
The passage of events is not the same
Si-mul-tan-eity
Is a relative property

If equal-sized spaceships pass in flight
From our point of view its black and white
The rights meet the lefts when the lefts meet the rights.
But that is only one point of view
The reference frame of you

Spaceship one sees two much shorter
And rights and lefts meet in a different order
To two the view is much the same, well sorta
But everything's the opposite way

*(Intro)

In relativity

Mass is equal to energy

This was a consequence

(That had) a whole lot of influence

With the energy from a little stone

You could easily power ten thousand homes

But if you look again, with a fine-tooth comb

You'll see thats not exactly the case

There is another face

Matter can't be totally converted

Without its opposite, itself inverted

And anti-matter (its been asserted)

Doesn't yet exist in our world

SPOKEN:

Except the positron which in the opposite of an electron!

Einstein's famous equation $E=mc^2$, where E is equal to
energy; m, to mass; and c, to the speed of light, means that



mass is always being converted to energy. Whenever you eat sing or do anything, but we can't see it happening because it involves very small particles. Scientists use this equation in nuclear reactions, in which one-one-hundredth of a particles mass is converted to energy, and this tiny conversion is enough to run ten-thousand homes. Or even blow up ten-thousand homes!

But the theory of relativity
Could find no place for gravity
it only dealt with constant velocity
So how does other motion pertain?

SPOKEN:

That was the question which spurred Einstein to make the jump from Special Relativity to General Relativity, which can be applied to the entire universe.

When you think equally
'bout acceleration and gravity
You'll see how they agree
In General relativity

In a room on the earth if you ~~drop~~^{throw} a ball,

In an arc to ~~Then onto~~ the ground the ball will fall,

And that isn't surprising, not at all

Cause that's how science says it should be

The law of gravity

But if your room is in acceleration

And moving skyward in empty spation.

You're gonna get the same information

The ball will fall exactly the same

SPOKEN:

Wait a minute, wait a minute. Jon, what is empty spation.

Oh, well, Greg that's a theoretical place or location where there is no gravitational field, or any forces of any kind acting on an object at rest.

Jon, that's empty space



Exactly. (pause) in fact:
If we're in a room and we drop a ball
And the room we're in is in free-fall
The ball will not fall, No, not at all
Cause that's how science says it should be,
At least to you and me.

SPOKEN: Wait a minute, wait a minute. Jon. So, in this situation, you say the ball will not fall, not at all. But the whole room is falling. So technically the ball is falling too!

Yes, but Greg, the whole point of the Principle of Equivalence is that this free-falling room is the same as a motionless room in empty space. *So its only important that the ball is motionless relative to me.*

This makes a lot of sense
This principle of equivalence
But what does it mean to me
What good is general relativity?
Einstein said light is like a ball
And it stays at the same place in free-fall
And on the earth at rest both light and ball
Seem to be going forward and down
Until they hit the ground
And since it's falling with acceleration
The light's responding to gravitation

SPOKEN: You know what, this proves that all the laws of physics are the same in all reference frames no matter where you are in the whole universe.

You know what the implication of this is, Greg?!

What?

That all space, the entire universe, is CURVED!

No.



Yes. You see, because a light beam is attracted to the earth, Einstein theorized, and it was proven, that light is bent by matter, and therefore gravity is an irrelevant concept. All things are attracted by matter. Therefore since the universe is filled with matter, space-time must be attracted to that matter: the entire universe must be curved.

So, gravity is the curvature of the universe.

Yes.

Then, that would imply that the universe is finite!

This realization was a big sensation
And genius fin'ly turned into fame.

That's our brief history
Of this science mystery
With the light of Einstein's theory
We solved a mortal query
Now I hope that you can see
Its a relative world to meeeeeeeeeeee.